



AT91SAM7S Series Evaluation Kit (SAM7S-EV)

User Manual

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Scope:

This document will provide information on the AT91SAM7S series evaluation board. With this board one can easily evaluate ATMEL® SAM7S series microcontroller both from hardware and software point of view. This is a quick start and an elegant way of migrating to the world of 32-bit high performance processors. The evaluation kit is called SAM7S-EK through the whole document.

Package contents:

The SAM7S-EK contents are as follows:

- One Mirani SAM7S evaluation kit
- One Power regulator board
- One SAM7S256 minimum system converted in DIP format
- One A/B-type USB cable
- One RS232 cable with the length of 1 meter
- One CD with Evaluation version of IAR Embedded workbench for ARM evaluation, related and useful datasheets, some programming applications like SAM-BA V2.6 (including SAM-PROG V2.4) and, AT91-ISP V1.0

SAM7S-EK features:

- CPU Minimum System is designed in a DIP Format to be removed / replaced easily with Other SAM7S Series.
- Blue Back Light 128*64 Graphic LCD with Brightness Control
- SD/MMC card Interface with Up to 4 Gigabyte Capacity
- 1 USB FIFO (FT245R)
- Onboard ATMEL 24x Series TWI EEPROM
- NTC Temperature Sensor Connected to ADC
- 3 Dedicated ADC Channel Connected to Multi Turns
- 1 UART with Full Modem Handshake
- 1 Dedicated UART Debug Port
- 1 RX/TX Based UART Channel
- 4 Analogue Outputs
- 4 PWM Outputs
- 3 Seven Segments with SPI Interface
- Blue Back Light 16*2 Characters LCD with Brightness Control
- All CPU Pins are routed to External Pin Headers
- 4 General Purpose Push Buttons
- 1 General Purpose 5V Buzzer
- 3 General Purpose LEDs

- Standard JTAG Connector with ARM 2 x 10 Pin Layouts for Programming / Debugging with ARM-JTAG
- CPU Minimum System Board Can be mounted on The Bread Board
- 1 on Chip USB Device

- On Board 3.3V Voltage Regulator with Up to 1.5 A Output Current
- Power Board can be mounted on the Bread Board
- Single Power Supply for All Peripherals
- 1 Power Status LED

Setting Up the SAM7S-EK:

- Electrostatic warning:

The AT91SAM7S-EK evaluation board is shipped in protective anti-static packaging. The board must not be subjected to high electrostatic potentials. A grounding strap or similar protective device should be worn when handling the board. Avoid touching the component pins or any other metallic element.

- Requirements:

In order to setup the SAM7S-EK and get started with the kit you need to have the following items:

- One SAM7S-EK
- One DC power supply capable of supplying 8V to 12V at 0.6A

SAM7S-EK Block Diagram:

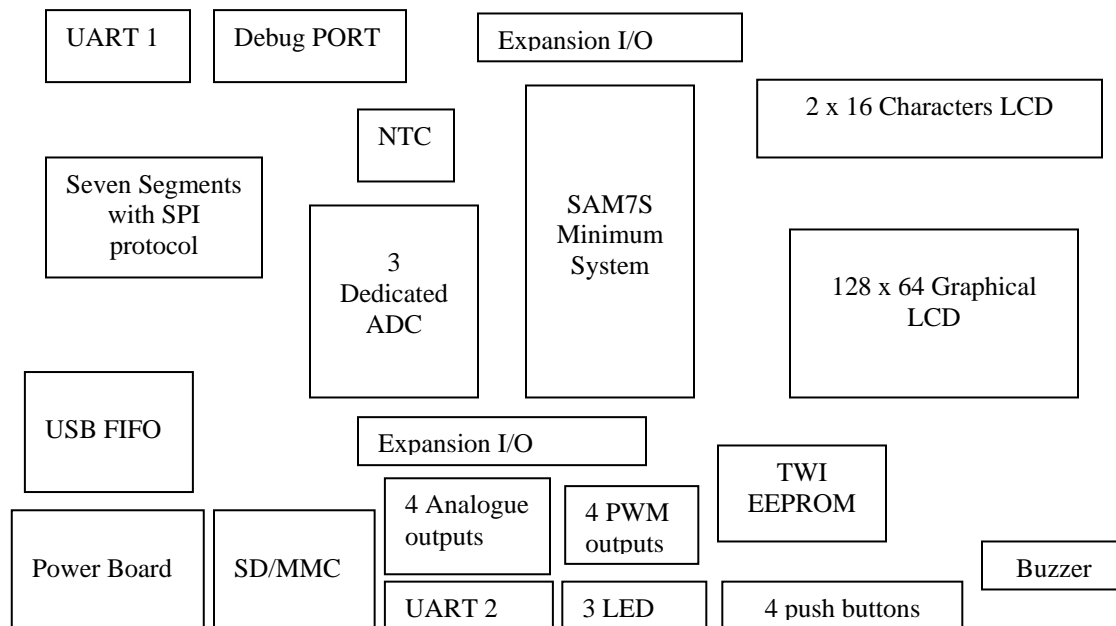


Figure No.1: SAM7S-EK block diagram

AT91SAM7S256 microcontroller:

- Incorporates the ARM7TDMI® ARM® Thumb® Processor
 - High-performance 32-bit RISC Architecture
 - High-density 16-bit Instruction Set
 - Leader in MIPS/Watt
 - EmbeddedICE™ In-circuit Emulation, Debug Communication Channel Support
- 256 Kbytes of Internal High-speed Flash, Organized in 1024 Pages of 256 Bytes
 - Single Cycle Access at Up to 30 MHz in Worst Case Conditions, Prefetch Buffer Optimizing Thumb Instruction Execution at Maximum Speed
 - Page Programming Time: 4 ms, Including Page Auto-erase, Full Erase Time: 10 ms
 - 10,000 Write Cycles, 10-year Data Retention Capability, Sector Lock Capabilities, Flash Security Bit
 - Fast Flash Programming Interface for High Volume Production
- 64 Kbytes of Internal High-speed SRAM, Single-cycle Access at Maximum Speed
- Memory Controller (MC)
 - Embedded Flash Controller, Abort Status and Misalignment Detection
- Reset Controller (RSTC)
 - Based on Power-on Reset and Low-power Factory-calibrated Brown-out Detector
 - Provides External Reset Signal Shaping and Reset Source Status
- Clock Generator (CKGR)
 - Low-power RC Oscillator, 3 to 20 MHz On-chip Oscillator and one PLL
- Power Management Controller (PMC)
 - Software Power Optimization Capabilities, Including Slow Clock Mode (Down to 500 Hz) and Idle Mode
 - Three Programmable External Clock Signals
- Advanced Interrupt Controller (AIC)
 - Individually Maskable, Eight-level Priority, Vectored Interrupt Sources
 - Two External Interrupt Sources and One Fast Interrupt Source, Spurious Interrupt Protected
- Debug Unit (DBGU)
 - 2-wire UART and Support for Debug Communication Channel interrupt, Programmable ICE Access Prevention
- Periodic Interval Timer (PIT)
 - 20-bit Programmable Counter plus 12-bit Interval Counter
- Windowed Watchdog (WDT)
 - 12-bit key-protected Programmable Counter
 - Provides Reset or Interrupt Signals to the System
 - Counter May Be Stopped While the Processor is in Debug State or in Idle Mode
- Real-time Timer (RTT)
 - 32-bit Free-running Counter with Alarm

- Runs Off the Internal RC Oscillator
- One Parallel Input/Output Controller (PIOA)
 - Thirty-Two Programmable I/O Lines Multiplexed with up to Two Peripheral I/Os
 - Input Change Interrupt Capability on Each I/O Line
 - Individually Programmable Open-drain, Pull-up resistor and Synchronous Output
- Eleven Peripheral Data Controller (PDC) Channels
- One USB 2.0 Full Speed (12 Mbits per second) Device Port
 - On-chip Transceiver, 328-byte Configurable Integrated FIFOs
- One Synchronous Serial Controller (SSC)
 - Independent Clock and Frame Sync Signals for Each Receiver and Transmitter
 - I²S Analog Interface Support, Time Division Multiplex Support
 - High-speed Continuous Data Stream Capabilities with 32-bit Data Transfer
- Two Universal Synchronous/Asynchronous Receiver Transmitters (USART)
 - Individual Baud Rate Generator, IrDA® Infrared Modulation/Demodulation
 - Support for ISO7816 T0/T1 Smart Card, Hardware Handshaking, RS485 Support
 - Manchester Encoder/Decoder
 - Full Modem Line Support on USART1
- One Master/Slave Serial Peripheral Interface (SPI)
 - 8- to 16-bit Programmable Data Length, Four External Peripheral Chip Selects
- One Three-channel 16-bit Timer/Counter (TC)
 - Three External Clock Inputs, Two Multi-purpose I/O Pins per Channel
 - Double PWM Generation, Capture/Waveform Mode, Up/Down Capability
- One Four-channel 16-bit PWM Controller (PWMC)
- One Two-wire Interface (TWI)
 - Master Mode Support Only, All Two-wire Atmel EEPROMs Supported
 - One 8-channel 10-bit Analog-to-Digital Converter, Four Channels Multiplexed with Digital I/Os
- IEEE® 1149.1 JTAG Boundary Scan on All Digital Pins
- 5V-tolerant I/Os, including Four High-current Drive I/O lines, Up to 16 mA Each
- Power Supplies
 - Embedded 1.8V Regulator, Drawing up to 100 mA for the Core and External Components
 - 1.8V or 3.3V VDDIO I/O Lines Power Supply, Independent 3.3V VDDFLASH Flash Power Supply
 - 1.8V VDDCORE Core Power Supply with Brown-out Detector
 - 3.3V VDDANA Analog Voltage Supply
- Fully Static Operation: Up to 55 MHz at 1.65V and 85°C Worst Case Conditions
- Available in a 64-lead TQFP Package

AT91SAM7S Block Diagram:

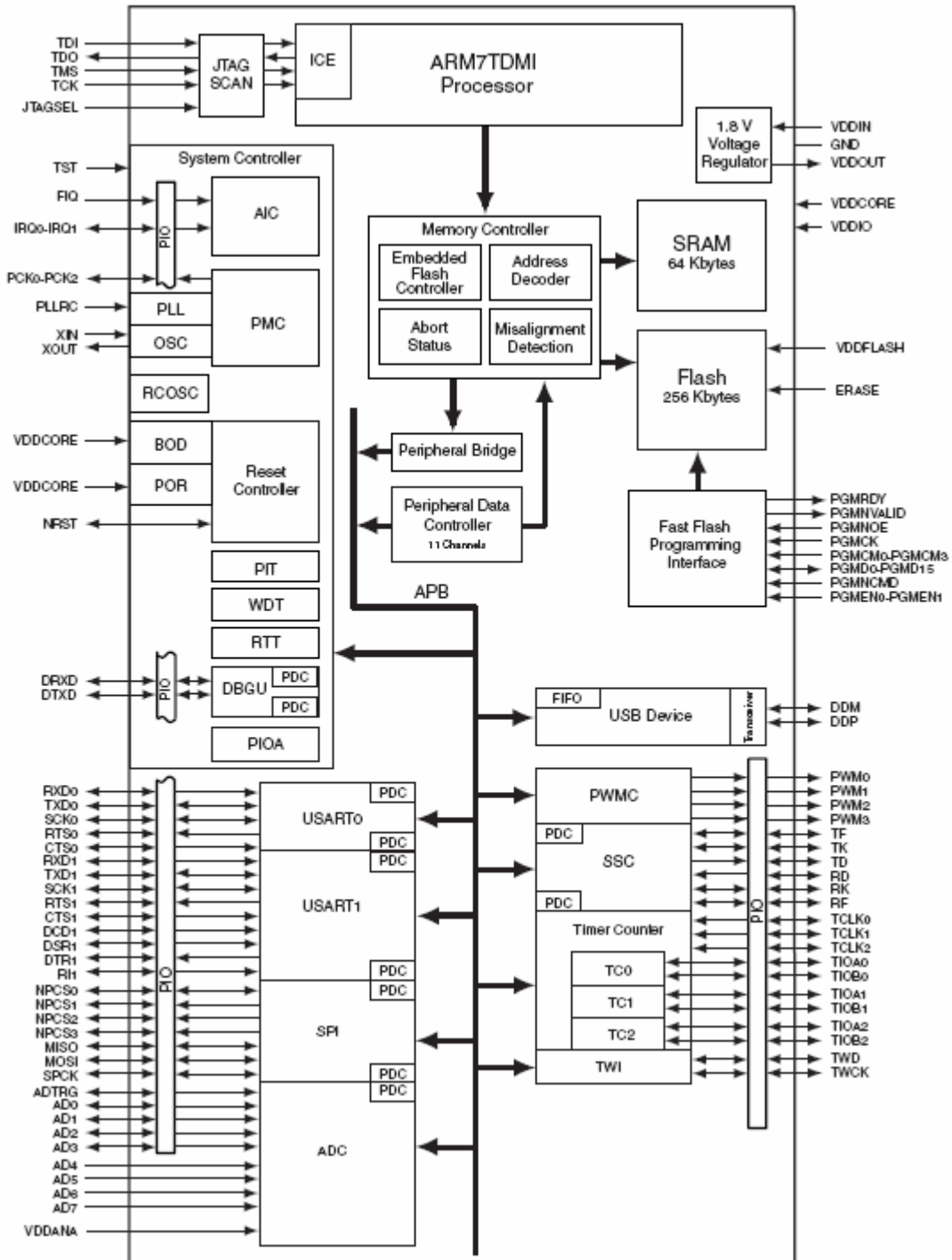


Figure No.2: AT91SAM7S256 block diagram

Jumpers and Configurations:

Some of the peripherals are multiplexed with each others. Hence, when using a specific peripheral care must be taken to close (short circuit) proper jumpers and open those required. Below you can find 2 tables. The first one show what signal is assigned to what jumpers and the second provide required information on which jumpers should be shorten to make use of a special peripheral.

Table No.1: Jumpers assignments

W1	Not Populated	NA
W2	LED1	PA0
W3	LED2	PA1
W4	LED3	PA2
W5	Not Populated	NA
W6	Graphical LCD Power Supply	+5V
W7	Character LCD Power Supply	+5V
W8	Graphical LCD Back Light	+9V (DC Input)
W9	Character LCD Back Light	+9V (DC Input)
W10	RTS on UART2	PA24
W11	TXD on UART2	PA22
W12	RXD on UART2	PA21
W13	CTS on UART2	PA25
W14	USB FIFO I/O Power Supply	+3.3V
W15	USB FIFO Power Supply	+5V
W16	USB FIFO Data Line 0	PA0
W17	USB FIFO Data Line 1	PA1
W18	USB FIFO Data Line 2	PA2
W19	USB FIFO Data Line 3	PA3
W20	USB FIFO Data Line 4	PA4
W21	USB FIFO Data Line 5	PA5
W22	USB FIFO Data Line 6	PA6
W23	USB FIFO Data Line 7	PA7
W24	USB FIFO RXF	PA21
W25	USB FIFO TXE	PA22
W26	USB FIFO RD	PA24
W27	USB FIFO WR	PA25
W28	Up Key	PA24
W29	Down Key	PA22
W30	Enter Key	PA23
W31	ESC Key	PA25
W32	USB FIFO Interrupt generator	PA20
W33	Seven Segments Power Supply	+5V
W34	Buzzer	PA7
W35	EEPROM SCL	PA4

W36	EEPROM SDA	PA3
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Table No.2: Peripherals jumpers

Push buttons	Up: W28 Down: W29 Enter: W30 ESC: W31
LEDs	LED1: W2 LED2: W3 LED3: W4
Buzzer	W34
ATMEL TWI EEPROM	SCL: W35 SDA: W36
Graphic LCD	Power Supply: W6 Back Light: W8
Character LCD	Power Supply: W7 Back Light: W9
Seven Segments	Power Supply: W33
UART 2	RTS: W10 TXD: W11 RXD: W12 CTS: W13
USB FIFO	USB FIFO I/O Power Supply: W14 USB FIFO Power Supply: W15 USB FIFO Data Line 0: W16 USB FIFO Data Line 1: W17 USB FIFO Data Line 2: W18 USB FIFO Data Line 3: W19 USB FIFO Data Line 4: W20 USB FIFO Data Line 5: W21 USB FIFO Data Line 6: W22 USB FIFO Data Line 7: W23 USB FIFO RXF: W24 USB FIFO TXE: W25 USB FIFO RD: W26 USB FIFO WR: W27 USB FIFO Interrupt generator: W32

Below you can find the assigned pins for graphic LCD, character LCD and, seven segments:

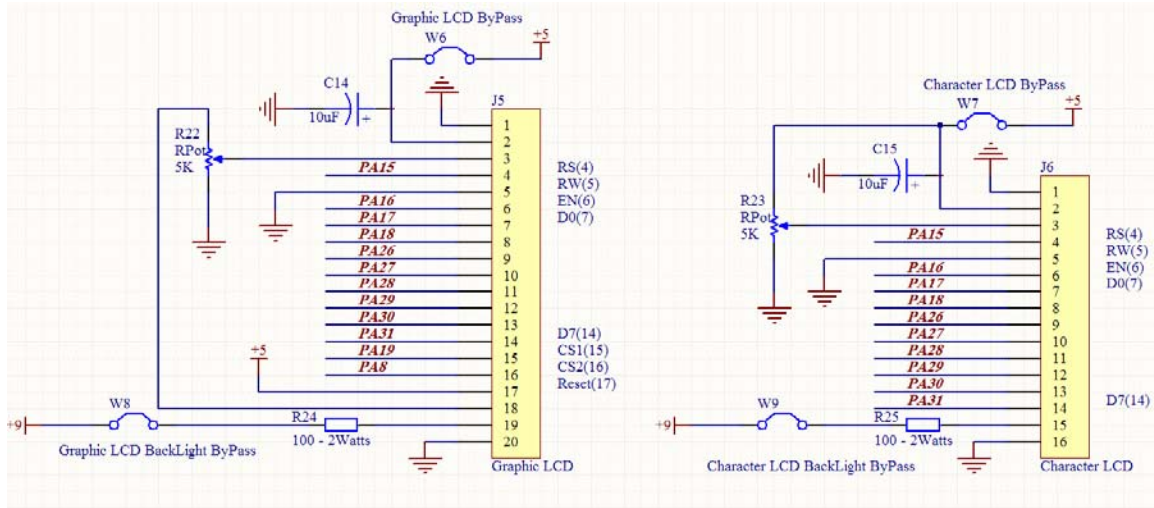


Figure No.3: Graphic and character LCD pin assignments

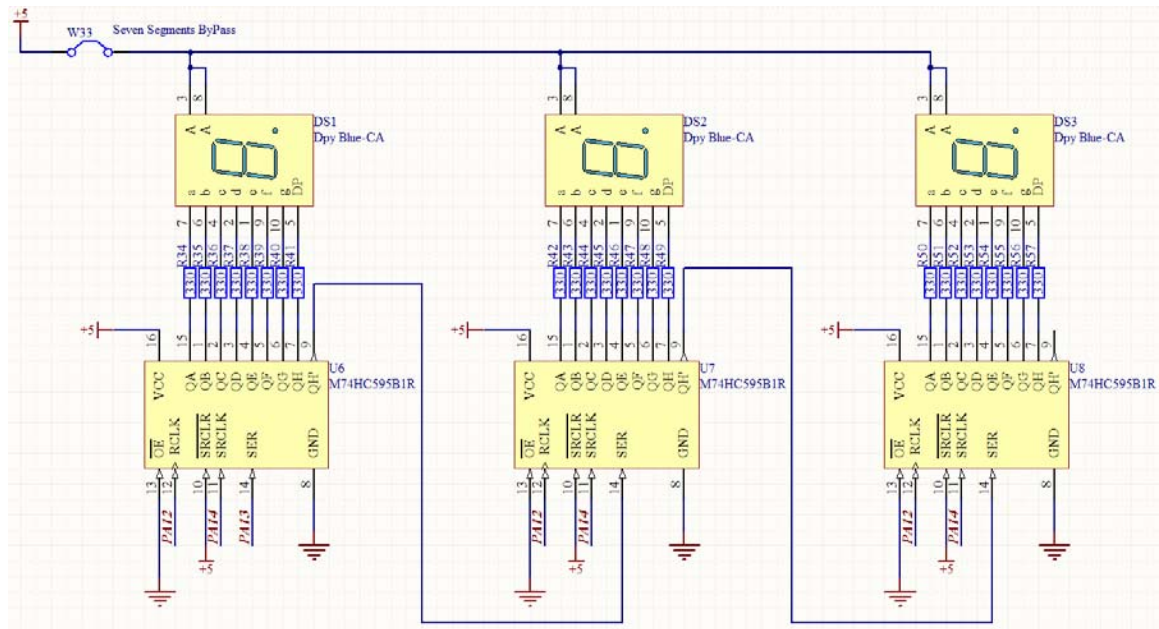


Figure No.4: Seven segments pin assignments

Other useful information may be found in developed software for SAM7S-EK and can be downloaded from <http://www.MiraniCo.us>